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# (12) UK Patent Application (19) GB (11) 2 294 821 (13) A

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(58) Field of Search

UK CL (Edition N) G3U UEG, H2F FMAS FMAX

F14, H2H HAB

INT CL<sup>6</sup> G05F 1/70, H02J 3/16 3/18, H02M 1/00

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## (54) Multilevel converter

(57) A multilevel converter 30 for connection in shunt or in series with each phase of a single or multi-phase AC system is configured as a chain comprising a plurality of links, each of which comprises a voltage-commutated converter providing a multilevel AC voltage, and a main control arrangement for controlling a switching sequence of the voltage-commutated converter such as to provide a total voltage across the ends of the chain which is an aggregate of the individual multilevel voltages of the voltage-commutated converters. Each voltage-commutated converter may consist of a bridge and a DC source or sink. The DC source or sink may be either a capacitor, a battery or a DC-AC or AC-DC converter. The multilevel converter may also include voltage-balancing means to maintain desired absolute or relative voltage levels on the DC sources or sinks within the chain. The converter may include GTO or IGBT devices and various circuits are described (Figs. 7 - 15). The control arrangement to regulate the converter is described (Figs. 17 - 22). A capacitor clamping arrangement (Figs. 23 - 25) may be provided.

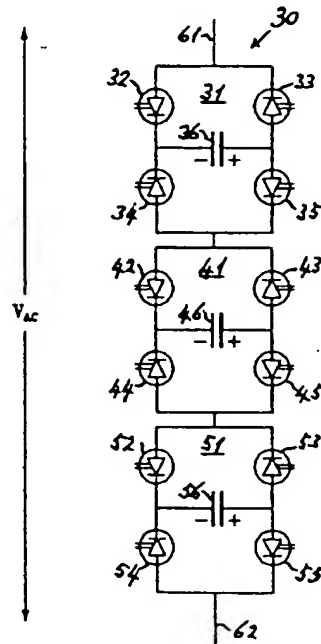


Figure 3

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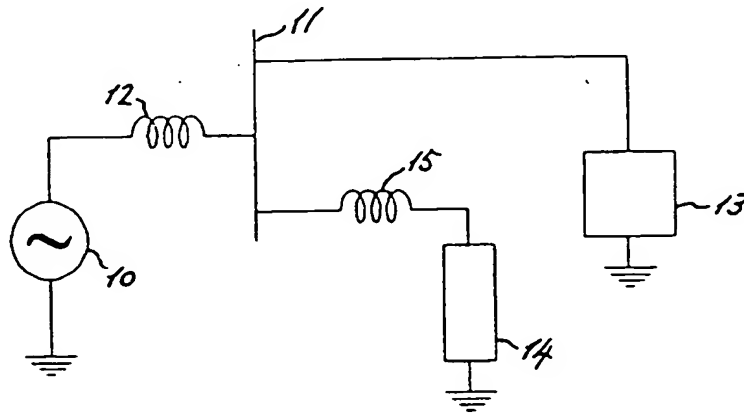


Figure 1

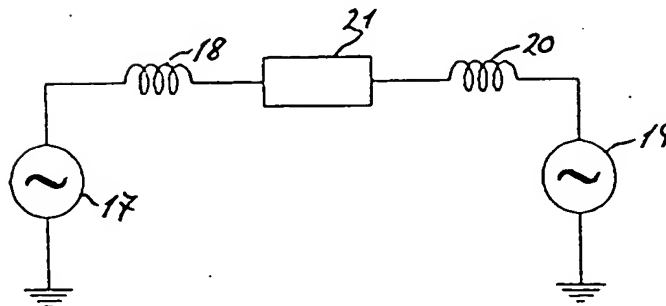


Figure 2

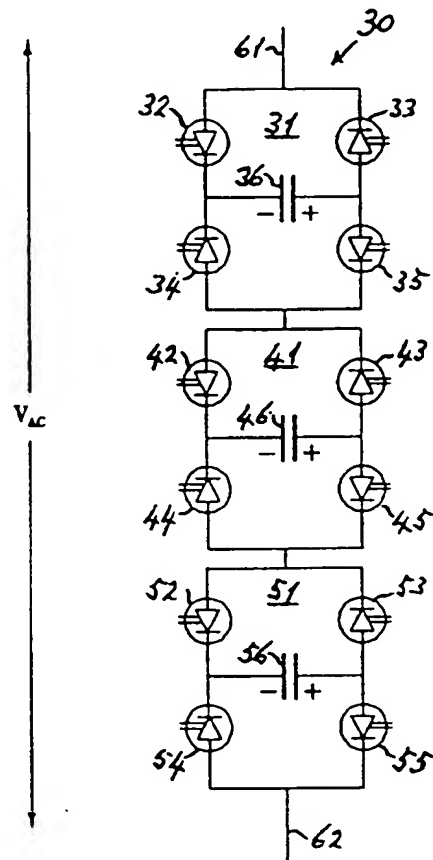


Figure 3

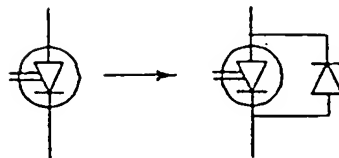


Figure 4

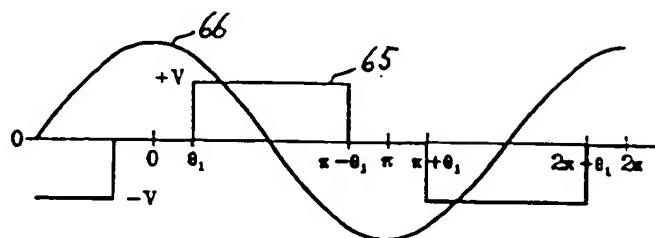


Figure 5

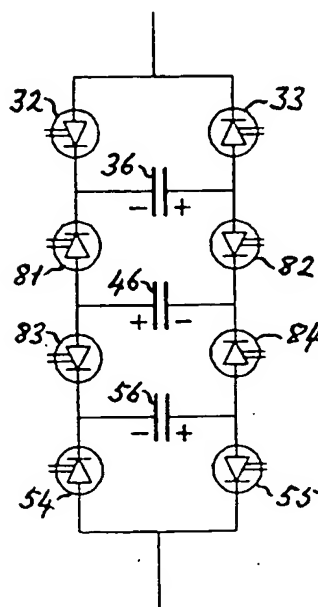


Figure 7

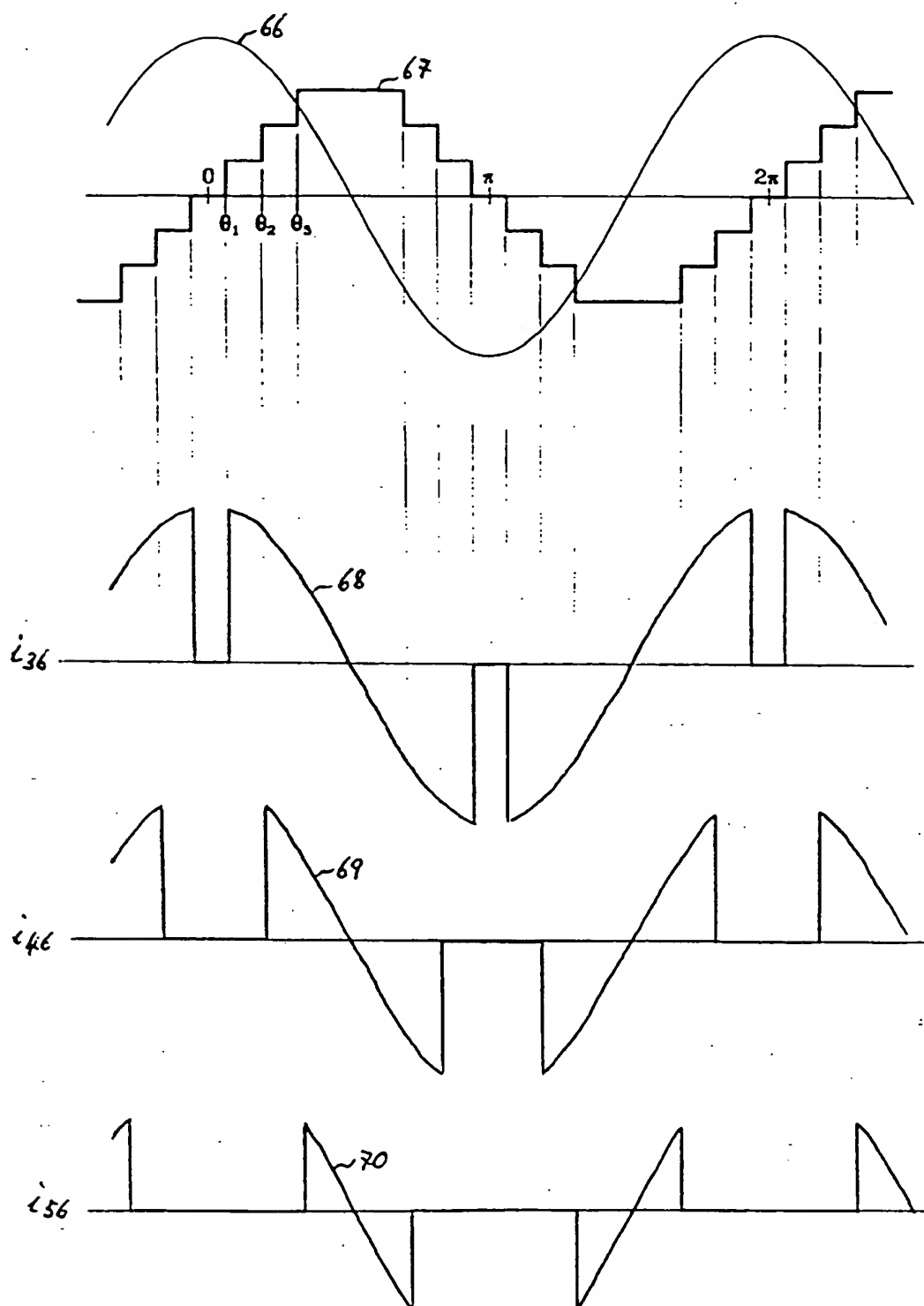


Figure 6

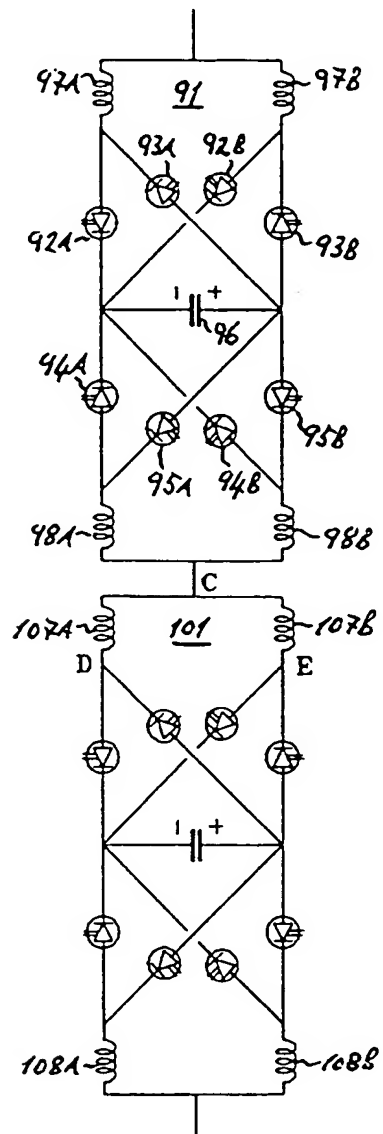


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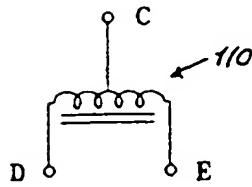


Figure 9

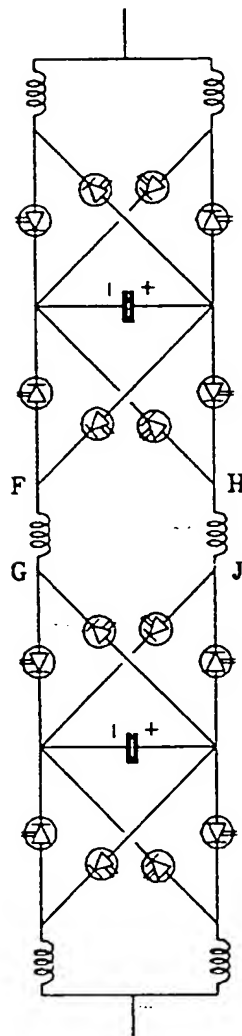


Figure 10



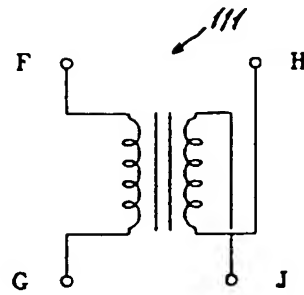


Figure 11

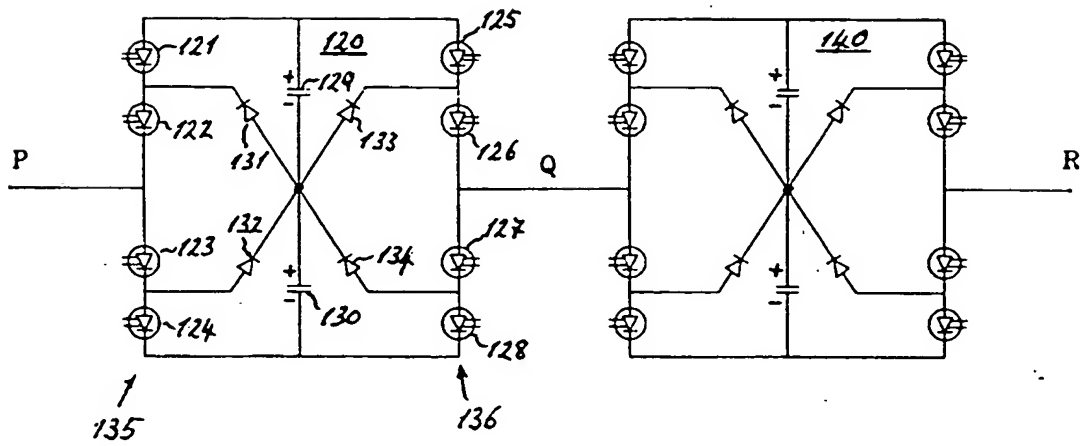


Figure 12

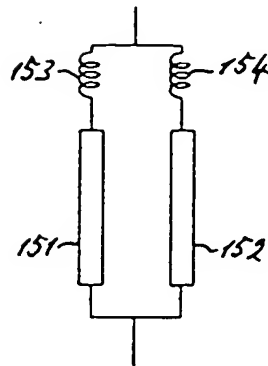


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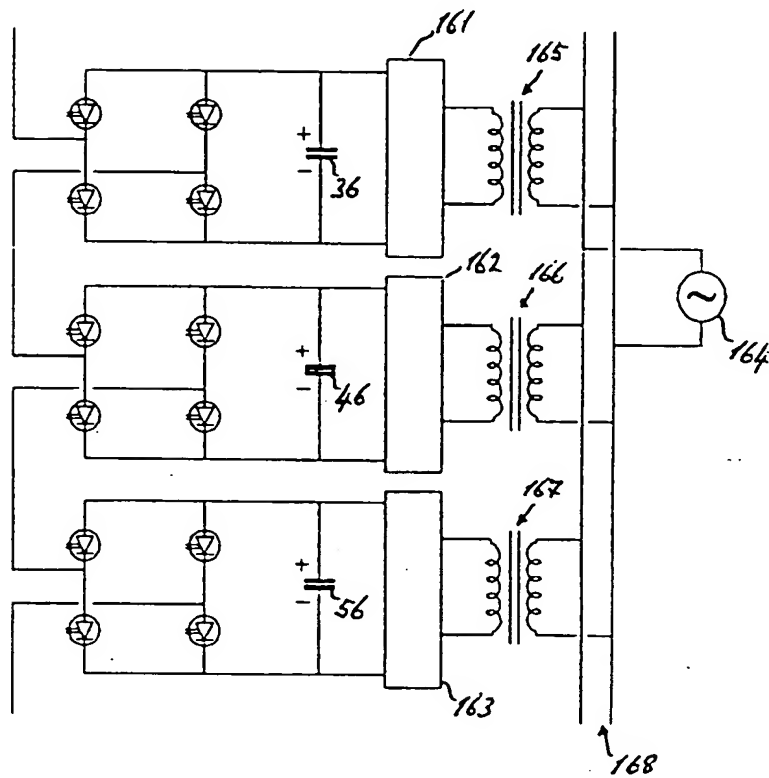


Figure 14

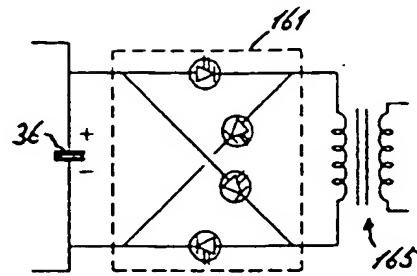


Figure 15

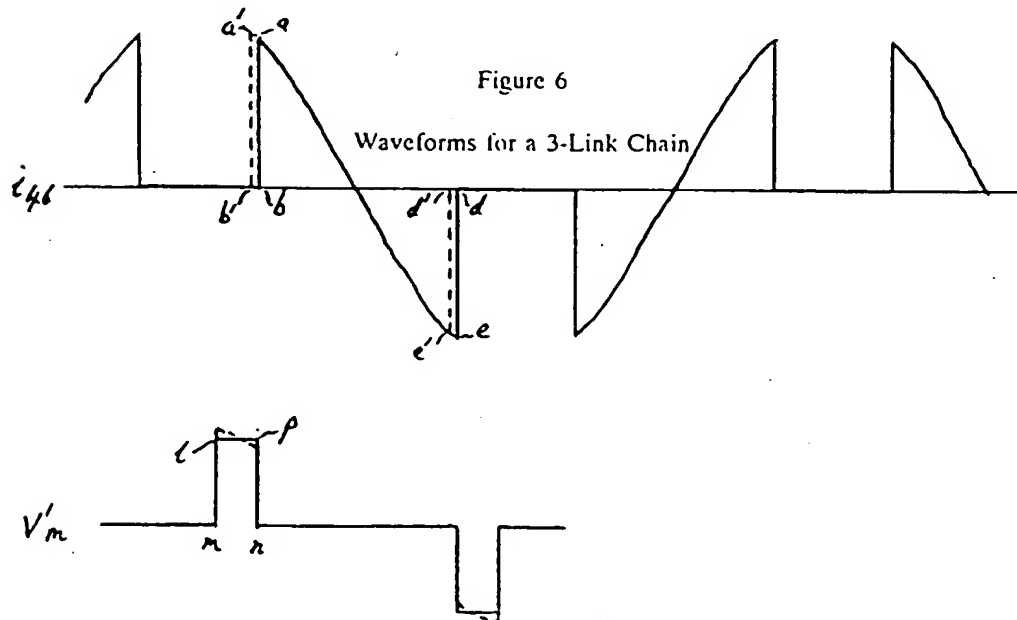
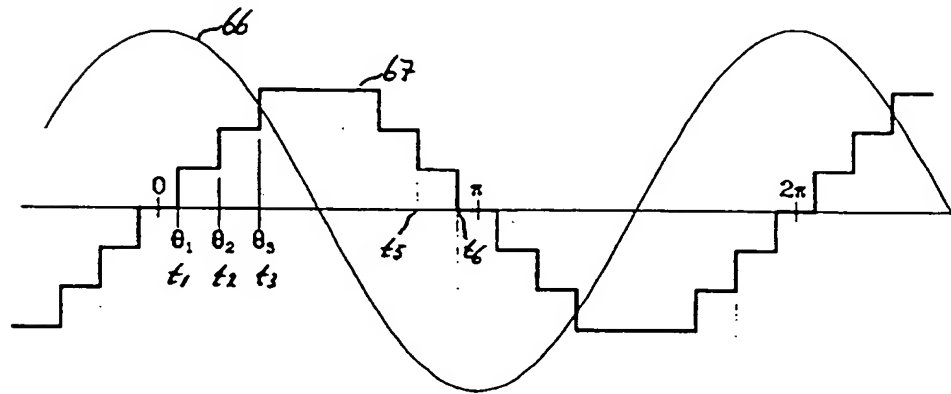


Figure 16